



#5

SEQUENCE LISTING

<110> Tucker, Kenneth  
Plosila, Laura

<120> MORAXELLA CATARRHALIS OUTER MEMBRANE PROTEIN-106 POLYPEPTIDE, GENE  
SEQUENCE AND USES THEREOF

<130> 7969-089-999

<140> 09/813,214

<141> 2001-03-20

<150> 08/968,685

<151> 1997-11-12

<160> 20

<170> PatentIn version 3.0

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 545 550 555 560  
 Asn Asn Gly Leu Thr Val Gly Asn Ser Thr Leu Asn Asn Asp Gly Leu  
 565 570 575  
 Ser Val Lys Asn Thr Asn Ser Asn Lys Gln Ile Gln Val Gly Ala Asp  
 580 585 590  
 Gly Ile Thr Phe Thr Asp Ile Ser Asn Ser Lys Pro Gly Ala Gly Ile  
 595 600 605  
 Glu Asn Thr Thr Arg Ile Thr Arg Asp Gly Ile Gly Phe Ala Asn Asn  
 610 615 620  
 Thr Gly Ser Leu Asp Ala Asn Lys Pro Arg Leu Thr Pro Thr Gly Ile  
 625 630 635 640  
 Asn Ala Gly Gly Lys Glu Leu Thr Asn Val Gln Ser Ala Ile Asn Pro  
 645 650 655  
 Ala Thr Asn Gly Gly Gln Leu Asp Phe Met Asn Arg Leu Ser Thr Ala  
 660 665 670

Asn Thr Glu Lys Ser Gly Ser Ala Ala Thr Ile Lys Asp Leu Tyr Asn  
 675 680 685  
 Leu Ser Gln Val Pro Leu Thr Phe Ala Gly Asp Thr Gly Pro Asn Val  
 690 695 700  
 Thr Lys Lys Leu Gly Glu Ile Leu Lys Val Lys Gly Gly Lys Thr Thr  
 705 710 715 720  
 Ala Asp Asp Leu Thr Lys Asn Asn Ile Gly Val Val Ala Asp Ser Thr  
 725 730 735  
 Asp Asn Ser Leu Thr Val Lys Leu Ala Lys Thr Leu Ser Asp Leu Asp  
 740 745 750  
 Ala Val Asn Thr Lys Thr Leu Thr Ala Ser Asp Lys Val Thr Val Asp  
 755 760 765  
 Ser Gly Asn Asn Thr Ala Lys Leu Gln Asn Gly Asp Leu Thr Phe Ser  
 770 775 780  
 Lys Gln Asn Thr Gly Ala Thr Pro Ala Thr Asn Ser Lys Thr Ile Gly  
 785 790 795 800  
 Val Asp Gly Leu Lys Phe Thr Asp Asn Asn Gly Ile Ala Leu Asp Gly  
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 Thr Thr Tyr Ile Thr Lys Asp Lys Val Gly Phe Ala Lys Gln Asp Gly  
 820 825 830  
 Ser Leu Asp Lys Ser Lys Pro Tyr Leu Asp Lys Asp Lys Leu Lys Val  
 835 840 845  
 Gly Glu Val Glu Ile Thr Thr Asn Gly Ile Asn Ala Gly Gly Lys Ala  
 850 855 860  
 Ile Thr Gly Leu Ser Asn Thr Leu Thr Asp Ala Thr Asn Ala Thr Thr  
 865 870 875 880  
 Gly His Val Thr Gln Leu Gly Ile Val Asp Ser Thr Asp Lys Thr Arg  
 885 890 895  
 Ala Ala Ser Ile Gly Asp Val Leu Asn Ala Gly Phe Asn Leu Lys Asn  
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 Asn Gly Asp Ala Lys Asp Phe Val Ser Thr Tyr Asp Thr Val Asp Phe  
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 Ile Asn Gly Asn Ala Thr Thr Ala Lys Val Thr Tyr Asp Gly Lys Ala  
 930 935 940  
 Ser Lys Val Ala Tyr Asp Val Asn Val Asp Gly Thr Thr Ile His Leu  
 945 950 955 960  
 Thr Gly Ala Asp Gly Asn Lys Asn Gln Ile Gly Val Lys Thr Thr Thr  
 965 970 975  
 Leu Thr Lys Thr Asp Ala Lys Gly Asp Lys Ala Ile Asn Phe Ser Val  
 980 985 990  
 Asn Ser Gly Asp Asp Lys Ala Leu Ile Asn Ala Lys Asp Ile Ala Asp  
 995 1000 1005

|      |     |     |     |     |     |      |     |     |     |     |      |     |     |     |
|------|-----|-----|-----|-----|-----|------|-----|-----|-----|-----|------|-----|-----|-----|
| Asn  | Leu | Asn | Thr | Leu | Ala | Gly  | Glu | Ile | Arg | Asn | Thr  | Lys | Gly | Thr |
| 1010 |     |     |     |     |     | 1015 |     |     |     |     | 1020 |     |     |     |
| Ala  | Asp | Thr | Ala | Leu | Gln | Thr  | Phe | Gln | Val | Lys | Lys  | Val | Lys | Glu |
| 1025 |     |     |     |     |     | 1030 |     |     |     |     | 1035 |     |     |     |
| Asn  | Gly | Asp | Asp | Asp | Asn | Asp  | Ala | Asp | Thr | Ile | Thr  | Val | Gly | Lys |
| 1040 |     |     |     |     |     | 1045 |     |     |     |     | 1050 |     |     |     |
| Asp  | Ala | Lys | Thr | Asn | Gln | Val  | Asn | Thr | Leu | Lys | Leu  | Lys | Gly | Lys |
| 1055 |     |     |     |     |     | 1060 |     |     |     |     | 1065 |     |     |     |
| Asn  | Gly | Leu | Asp | Ile | Gln | Thr  | Asn | Lys | Asp | Gly | Thr  | Val | Thr | Phe |
| 1070 |     |     |     |     |     | 1075 |     |     |     |     | 1080 |     |     |     |
| Gly  | Ile | Asn | Thr | Gln | Ser | Gly  | Leu | Lys | Ala | Gly | Asn  | Asn | Thr | Thr |
| 1085 |     |     |     |     |     | 1090 |     |     |     |     | 1095 |     |     |     |
| Leu  | Asn | Asn | Asn | Gly | Leu | Ser  | Ile | Lys | Asn | Thr | Ala  | Gly | Asn | Glu |
| 1100 |     |     |     |     |     | 1105 |     |     |     |     | 1110 |     |     |     |
| Gln  | Ile | Gln | Val | Gly | Ala | Asp  | Gly | Val | Lys | Phe | Ala  | Lys | Val | Asn |
| 1115 |     |     |     |     |     | 1120 |     |     |     |     | 1125 |     |     |     |
| Asn  | Gly | Val | Val | Gly | Ala | Gly  | Ile | Asp | Gly | Thr | Thr  | Arg | Ile | Thr |
| 1130 |     |     |     |     |     | 1135 |     |     |     |     | 1140 |     |     |     |
| Arg  | Asp | Glu | Ile | Gly | Phe | Ala  | Gly | Thr | Asn | Gly | Ser  | Leu | Asp | Lys |
| 1145 |     |     |     |     |     | 1150 |     |     |     |     | 1155 |     |     |     |
| Ser  | Lys | Pro | His | Leu | Ser | Lys  | Asp | Gly | Ile | Asn | Ala  | Gly | Gly | Lys |
| 1160 |     |     |     |     |     | 1165 |     |     |     |     | 1170 |     |     |     |
| Lys  | Ile | Thr | Asn | Ile | Gln | Ser  | Gly | Glu | Ile | Ala | Gln  | Asn | Ser | Asn |
| 1175 |     |     |     |     |     | 1180 |     |     |     |     | 1185 |     |     |     |
| Asp  | Ala | Val | Thr | Gly | Gly | Lys  | Ile | Tyr | Asp | Leu | Lys  | Thr | Glu | Leu |
| 1190 |     |     |     |     |     | 1195 |     |     |     |     | 1200 |     |     |     |
| Glu  | Asn | Lys | Ile | Ser | Ser | Thr  | Ala | Lys | Thr | Ala | Gln  | Asn | Ser | Leu |
| 1205 |     |     |     |     |     | 1210 |     |     |     |     | 1215 |     |     |     |
| His  | Glu | Phe | Ser | Val | Ala | Asp  | Glu | Gln | Gly | Asn | Asn  | Phe | Thr | Val |
| 1220 |     |     |     |     |     | 1225 |     |     |     |     | 1230 |     |     |     |
| Ser  | Asn | Pro | Tyr | Ser | Ser | Tyr  | Asp | Thr | Ser | Lys | Thr  | Ser | Asp | Val |
| 1235 |     |     |     |     |     | 1240 |     |     |     |     | 1245 |     |     |     |
| Ile  | Thr | Phe | Ala | Gly | Glu | Asn  | Gly | Ile | Thr | Thr | Lys  | Val | Asn | Lys |
| 1250 |     |     |     |     |     | 1255 |     |     |     |     | 1260 |     |     |     |
| Gly  | Val | Val | Arg | Val | Gly | Ile  | Asp | Gln | Thr | Lys | Gly  | Leu | Thr | Thr |
| 1265 |     |     |     |     |     | 1270 |     |     |     |     | 1275 |     |     |     |
| Pro  | Lys | Leu | Thr | Val | Gly | Asn  | Asn | Asn | Gly | Lys | Gly  | Ile | Val | Ile |
| 1280 |     |     |     |     |     | 1285 |     |     |     |     | 1290 |     |     |     |
| Asp  | Ser | Gln | Asn | Gly | Gln | Asn  | Thr | Ile | Thr | Gly | Leu  | Ser | Asn | Thr |
| 1295 |     |     |     |     |     | 1300 |     |     |     |     | 1305 |     |     |     |
| Leu  | Ala | Asn | Val | Thr | Asn | Asp  | Lys | Gly | Ser | Val | Arg  | Thr | Thr | Glu |
| 1310 |     |     |     |     |     | 1315 |     |     |     |     | 1320 |     |     |     |

|         |                 |      |                     |             |
|---------|-----------------|------|---------------------|-------------|
| Gln Gly | Lys Ile Ile Lys | Asp  | Glu Asp Lys Thr Arg | Ala Ala Ser |
| 1325    |                 | 1330 |                     | 1335        |
| Ile Val | Asp Val Leu Ser | Ala  | Gly Phe Asn Leu Gln | Gly Asn Gly |
| 1340    |                 | 1345 |                     | 1350        |
| Glu Ala | Val Asp Phe Val | Ser  | Thr Tyr Asp Thr Val | Asn Phe Ala |
| 1355    |                 | 1360 |                     | 1365        |
| Asp Gly | Asn Ala Thr Thr | Ala  | Lys Val Thr Tyr Asp | Asp Thr Ser |
| 1370    |                 | 1375 |                     | 1380        |
| Lys Thr | Ser Lys Val Val | Tyr  | Asp Val Asn Val Asp | Asp Thr Thr |
| 1385    |                 | 1390 |                     | 1395        |
| Ile Glu | Val Lys Asp Lys | Lys  | Leu Gly Val Lys Thr | Thr Thr Leu |
| 1400    |                 | 1405 |                     | 1410        |
| Thr Ser | Thr Gly Thr Gly | Ala  | Asn Lys Phe Ala Leu | Ser Asn Gln |
| 1415    |                 | 1420 |                     | 1425        |
| Ala Thr | Gly Asp Ala Leu | Val  | Lys Ala Ser Asp Ile | Val Ala His |
| 1430    |                 | 1435 |                     | 1440        |
| Leu Asn | Thr Leu Ser Gly | Asp  | Ile Gln Thr Ala Lys | Gly Ala Ser |
| 1445    |                 | 1450 |                     | 1455        |
| Gln Ala | Asn Ser Ser Ala | Gly  | Tyr Val Asp Ala Asp | Gly Asn Lys |
| 1460    |                 | 1465 |                     | 1470        |
| Val Ile | Tyr Asp Ser Thr | Asp  | Asn Lys Tyr Tyr Gln | Ala Lys Asn |
| 1475    |                 | 1480 |                     | 1485        |
| Asp Gly | Thr Val Asp Lys | Thr  | Lys Glu Val Ala Lys | Asp Lys Leu |
| 1490    |                 | 1495 |                     | 1500        |
| Val Ala | Gln Ala Gln Thr | Pro  | Asp Gly Thr Leu Ala | Gln Met Asn |
| 1505    |                 | 1510 |                     | 1515        |
| Val Lys | Ser Val Ile Asn | Lys  | Glu Gln Val Asn Asp | Ala Asn Lys |
| 1520    |                 | 1525 |                     | 1530        |
| Lys Gln | Gly Ile Asn Glu | Asp  | Asn Ala Phe Val Lys | Gly Leu Glu |
| 1535    |                 | 1540 |                     | 1545        |
| Lys Ala | Ala Ser Asp Asn | Lys  | Thr Lys Asn Ala Ala | Val Thr Val |
| 1550    |                 | 1555 |                     | 1560        |
| Gly Asp | Leu Asn Ala Val | Ala  | Gln Thr Pro Leu Thr | Phe Ala Gly |
| 1565    |                 | 1570 |                     | 1575        |
| Asp Thr | Gly Thr Thr Ala | Lys  | Lys Leu Gly Glu Thr | Leu Thr Ile |
| 1580    |                 | 1585 |                     | 1590        |
| Lys Gly | Gly Gln Thr Asp | Thr  | Asn Lys Leu Thr Asp | Asn Asn Ile |
| 1595    |                 | 1600 |                     | 1605        |
| Gly Val | Val Ala Gly Thr | Asp  | Gly Phe Thr Val Lys | Leu Ala Lys |
| 1610    |                 | 1615 |                     | 1620        |
| Asp Leu | Thr Asn Leu Asn | Ser  | Val Asn Ala Gly Gly | Thr Lys Ile |
| 1625    |                 | 1630 |                     | 1635        |

|      |     |     |     |     |     |      |     |     |     |     |      |     |     |     |
|------|-----|-----|-----|-----|-----|------|-----|-----|-----|-----|------|-----|-----|-----|
| Asp  | Asp | Lys | Gly | Val | Ser | Phe  | Val | Asp | Ser | Ser | Gly  | Gln | Ala | Lys |
| 1640 |     |     |     |     |     | 1645 |     |     |     |     | 1650 |     |     |     |
| Ala  | Asn | Thr | Pro | Val | Leu | Ser  | Ala | Asn | Gly | Leu | Asp  | Leu | Gly | Gly |
| 1655 |     |     |     |     |     | 1660 |     |     |     |     | 1665 |     |     |     |
| Lys  | Val | Ile | Ser | Asn | Val | Gly  | Lys | Gly | Thr | Lys | Asp  | Thr | Asp | Ala |
| 1670 |     |     |     |     |     | 1675 |     |     |     |     | 1680 |     |     |     |
| Ala  | Asn | Val | Gln | Gln | Leu | Asn  | Glu | Val | Arg | Asn | Leu  | Leu | Gly | Leu |
| 1685 |     |     |     |     |     | 1690 |     |     |     |     | 1695 |     |     |     |
| Gly  | Asn | Ala | Gly | Asn | Asp | Asn  | Ala | Asp | Gly | Asn | Gln  | Val | Asn | Ile |
| 1700 |     |     |     |     |     | 1705 |     |     |     |     | 1710 |     |     |     |
| Ala  | Asp | Ile | Lys | Lys | Asp | Pro  | Asn | Ser | Gly | Ser | Ser  | Ser | Asn | Arg |
| 1715 |     |     |     |     |     | 1720 |     |     |     |     | 1725 |     |     |     |
| Thr  | Val | Ile | Lys | Ala | Gly | Thr  | Val | Leu | Gly | Gly | Lys  | Gly | Asn | Asn |
| 1730 |     |     |     |     |     | 1735 |     |     |     |     | 1740 |     |     |     |
| Asp  | Thr | Glu | Lys | Leu | Ala | Thr  | Gly | Gly | Val | Gln | Val  | Gly | Val | Asp |
| 1745 |     |     |     |     |     | 1750 |     |     |     |     | 1755 |     |     |     |
| Lys  | Asp | Gly | Asn | Ala | Asn | Gly  | Asp | Leu | Ser | Asn | Val  | Trp | Val | Lys |
| 1760 |     |     |     |     |     | 1765 |     |     |     |     | 1770 |     |     |     |
| Thr  | Gln | Lys | Asp | Gly | Ser | Lys  | Lys | Ala | Leu | Leu | Ala  | Thr | Tyr | Asn |
| 1775 |     |     |     |     |     | 1780 |     |     |     |     | 1785 |     |     |     |
| Ala  | Ala | Gly | Gln | Thr | Asn | Tyr  | Leu | Thr | Asn | Asn | Pro  | Ala | Glu | Ala |
| 1790 |     |     |     |     |     | 1795 |     |     |     |     | 1800 |     |     |     |
| Ile  | Asp | Arg | Ile | Asn | Glu | Gln  | Gly | Ile | Arg | Phe | Phe  | His | Val | Asn |
| 1805 |     |     |     |     |     | 1810 |     |     |     |     | 1815 |     |     |     |
| Asp  | Gly | Asn | Gln | Glu | Pro | Val  | Val | Gln | Gly | Arg | Asn  | Gly | Ile | Asp |
| 1820 |     |     |     |     |     | 1825 |     |     |     |     | 1830 |     |     |     |
| Ser  | Ser | Ala | Ser | Gly | Lys | His  | Ser | Val | Ala | Ile | Gly  | Phe | Gln | Ala |
| 1835 |     |     |     |     |     | 1840 |     |     |     |     | 1845 |     |     |     |
| Lys  | Ala | Asp | Gly | Glu | Ala | Ala  | Val | Ala | Ile | Gly | Arg  | Gln | Thr | Gln |
| 1850 |     |     |     |     |     | 1855 |     |     |     |     | 1860 |     |     |     |
| Ala  | Gly | Asn | Gln | Ser | Ile | Ala  | Ile | Gly | Asp | Asn | Ala  | Gln | Ala | Thr |
| 1865 |     |     |     |     |     | 1870 |     |     |     |     | 1875 |     |     |     |
| Gly  | Asp | Gln | Ser | Ile | Ala | Ile  | Gly | Thr | Gly | Asn | Val  | Val | Ala | Gly |
| 1880 |     |     |     |     |     | 1885 |     |     |     |     | 1890 |     |     |     |
| Lys  | His | Ser | Gly | Ala | Ile | Gly  | Asp | Pro | Ser | Thr | Val  | Lys | Ala | Asp |
| 1895 |     |     |     |     |     | 1900 |     |     |     |     | 1905 |     |     |     |
| Asn  | Ser | Tyr | Ser | Val | Gly | Asn  | Asn | Asn | Gln | Phe | Thr  | Asp | Ala | Thr |
| 1910 |     |     |     |     |     | 1915 |     |     |     |     | 1920 |     |     |     |
| Gln  | Thr | Asp | Val | Phe | Gly | Val  | Gly | Asn | Asn | Ile | Thr  | Val | Thr | Glu |
| 1925 |     |     |     |     |     | 1930 |     |     |     |     | 1935 |     |     |     |
| Ser  | Asn | Ser | Val | Ala | Leu | Gly  | Ser | Asn | Ser | Ala | Ile  | Ser | Ala | Gly |
| 1940 |     |     |     |     |     | 1945 |     |     |     |     | 1950 |     |     |     |

|      |     |     |     |     |     |      |     |     |     |     |      |     |     |     |
|------|-----|-----|-----|-----|-----|------|-----|-----|-----|-----|------|-----|-----|-----|
| Thr  | His | Ala | Gly | Thr | Gln | Ala  | Lys | Lys | Ser | Asp | Gly  | Thr | Ala | Gly |
| 1955 |     |     |     |     |     | 1960 |     |     |     |     | 1965 |     |     |     |
| Thr  | Thr | Thr | Thr | Ala | Gly | Ala  | Thr | Gly | Thr | Val | Lys  | Gly | Phe | Ala |
| 1970 |     |     |     |     |     | 1975 |     |     |     |     | 1980 |     |     |     |
| Gly  | Gln | Thr | Ala | Val | Gly | Ala  | Val | Ser | Val | Gly | Ala  | Ser | Gly | Ala |
| 1985 |     |     |     |     |     | 1990 |     |     |     |     | 1995 |     |     |     |
| Glu  | Arg | Arg | Ile | Gln | Asn | Val  | Ala | Ala | Gly | Glu | Val  | Ser | Ala | Thr |
| 2000 |     |     |     |     |     | 2005 |     |     |     |     | 2010 |     |     |     |
| Ser  | Thr | Asp | Ala | Val | Asn | Gly  | Ser | Gln | Leu | Tyr | Lys  | Ala | Thr | Gln |
| 2015 |     |     |     |     |     | 2020 |     |     |     |     | 2025 |     |     |     |
| Gly  | Ile | Ala | Asn | Ala | Thr | Asn  | Glu | Leu | Asp | His | Arg  | Ile | His | Gln |
| 2030 |     |     |     |     |     | 2035 |     |     |     |     | 2040 |     |     |     |
| Asn  | Glu | Asn | Lys | Ala | Asn | Ala  | Gly | Ile | Ser | Ser | Ala  | Met | Ala | Met |
| 2045 |     |     |     |     |     | 2050 |     |     |     |     | 2055 |     |     |     |
| Ala  | Ser | Met | Pro | Gln | Ala | Tyr  | Ile | Pro | Gly | Arg | Ser  | Met | Val | Thr |
| 2060 |     |     |     |     |     | 2065 |     |     |     |     | 2070 |     |     |     |
| Gly  | Gly | Ile | Ala | Thr | His | Asn  | Gly | Gln | Gly | Ala | Val  | Ala | Val | Gly |
| 2075 |     |     |     |     |     | 2080 |     |     |     |     | 2085 |     |     |     |
| Leu  | Ser | Lys | Leu | Ser | Asp | Asn  | Gly | Gln | Trp | Val | Phe  | Lys | Ile | Asn |
| 2090 |     |     |     |     |     | 2095 |     |     |     |     | 2100 |     |     |     |
| Gly  | Ser | Ala | Asp | Thr | Gln | Gly  | His | Val | Gly | Ala | Ala  | Val | Gly | Ala |
| 2105 |     |     |     |     |     | 2110 |     |     |     |     | 2115 |     |     |     |
| Gly  | Phe | His | Phe |     |     |      |     |     |     |     |      |     |     |     |
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<213> Moraxella catarrhalis

<400> 10

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Arg Gly Asp Lys Ser Ile Ala Ile Gly Asp Ile Ala Gln Ala Leu Gly  
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Ser Gln Ser Ile Ala Ile Gly Asp  
35 40

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<213> Moraxella catarrhalis

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<213> Moraxella catarrhalis

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Ala Arg

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<212> PRT

<213> Moraxella catarrhalis

<400> 14

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Ala Thr



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18

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gacattgcgc aa

72

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29

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